The diet of peacock blenny, *Salaria pavo* (Blenniidae), in the eastern Adriatic Sea

by

Mate ŠANTIĆ (1), Armin PALLAORO (2) & Ivan JARDAS (1)

ABSTRACT. - The diet of the peacock blenny, *Salaria pavo* (Risso, 1810), was investigated with respect to fish size and diurnal cycle. Stomach contents of 518 specimens, 4.9-14.4 cm TL, collected by a small beach seine from April to October, in 2002 and 2003, were analyzed, and 88 were empty (16.9%). This percentage varied significantly along the diurnal cycle, with a maximum number of empty stomachs recorded during the daily period (29.3%) and minimum at the evening hours (10.2%). The peacock blenny feeds on 8 major prey groups: Amphipoda, Gastropoda, Decapoda, Bivalvia, Isopoda, fish eggs, Algae and "others" (including Cirripedia, Polychaeta, Spongia, Copepoda, Polyplacophora, Ophiuroidea and Insecta). Amphipods were the most important prey, constituting 62.7% of the total IRI, followed by gastropods (%IRI = 17.8). The most frequent prey were the amphipod *Talitrus saltator* (%IRI = 10.1), the gastropod *Monodonta turbinata* (%IRI = 4.6) and the amphipod *Gammarus olivi* (%IRI = 3.8). Diet composition showed significant overlap in relation with the fish size and amphipods constituted the main prey in all size classes. The composition of prey ingested and feeding intensity changed during the diurnal cycle. Amphipods dominated in evening (%IRI = 71.0) and early morning diet (%IRI = 74.0), while gastropods (%IRI = 36.8) and bivalves (%IRI = 25.5) where most frequently in the daily hours. The highest feeding intensity was recorded at the evening hours and during early morning. Various prey groups and species found in the stomach indicates that peacock blenny is a generalistic fish.

RÉSUMÉ. - Alimentation de la blennie-paon, *Salaria pavo* (Blenniidae), en mer Adriatique.

Le régime alimentaire de la blennie-paon, *Salaria pavo* (Risso, 1810), a été étudié en fonction de la taille des poissons et du cycle journalier. Les contenus stomacaux de 518 spécimens, 4,9-14,4 cm TL capturés par une petite seine de plage d'avril à octobre, en 2002 et 2003, ont été analysés. Parmi les estomacs examinés, 88 étaient vides (16,9%). Ce pourcentage a changé de manière significative lors du cycle journalier, avec un maximum d'estomacs vides enregistré pendant le jour (29,3%), et un minimum pendant la soirée (10,2%). Le contenu stomacal de *Salaria pavo* est composé de 8 groupes principaux de proies : amphipodes, gastéropodes, décapodes, bivalves, isopodes, œufs de poissons, algues et "autres" (cirripèdes, polychètes, éponges, copépodes, polyplacophores, ophiures et insectes). Les amphipodes sont les proies les plus importantes, constituant 62,7% de l'IRI, suivi des gastéropodes (%IRI = 17,8). Au niveau spécifique, l'amphipode *Talitrus saltator* (%IRI = 10,1), le gastéropode *Monodonta turbinata* (%IRI = 4,6) et l'amphipode *Gammarus olivi* (%IRI = 3,8) sont les proies les plus fréquentes. La composition alimentaire a montré le recouvrement significatif d'alimentation en fonction de la taille des poissons, bien que les amphipodes aient été les proies principales dans toutes les classes de taille. La composition des proies et l'intensité de l'alimentation ont changé pendant le cycle journalier. Les amphipodes ont dominé dans l'alimentation en soirée (%IRI = 71,0) et tôt le matin (%IRI = 74,0), tandis que les gastéropodes (%IRI = 36,8) et les bivalves (%IRI = 25,5) ont été plus fréquemment consommés le jour. L'intensité d'alimentation la plus élevée a été enregistrée en soirée et tôt le matin. Les divers groupes et espèces de proies trouvées dans l'estomac suggèrent que *Salaria pavo* est un poisson généraliste.

Key words. - Blenniidae - *Salaria pavo* - MED - Adriatic Sea - Diet.

The peacock blenny, *Salaria pavo* (Risso, 1810), is a common fish in shallow waters of the rocky littoral of the Mediterranean, Black Sea and eastern Atlantic from Biscay bay to Morocco (Zander, 1986). This species differs from many other Blenniidae by its ability to colonize biotopes where hard substrates are scarce (Moosleitner, 1980), and by its great euryhaline and eurythermal tolerance limits (Moosleitner, 1988). It is very common in the Adriatic Sea where its spawns from May to July (Jardas, 1996). The peacock blenny shows hibernation during winter months when sea temperature in shallow waters is below 10°C (Pallaoro, 1988). Although different aspects of its biology have been studied in Adriatic (Goldschmid *et al.*, 1980; Patzner, 1985; Kotrschal, 1988), Mediterranean Sea (Fishelson, 1963a; Papaconstantinou, 1977, 1979; Ruchon *et al.*, 1998) and Atlantic Sea (Almada *et al.*, 1994; Gonçalves *et al.*, 2002) studies of diet are relatively rare. Descriptions of peacock blenny diet in the Adriatic Sea are scarce, generally not current, and deal only with qualitative aspects. Only two studies have provided qualitative description of diet of *S. pavo* in the Adriatic Sea (Goldschmid *et al.*, 1980; Jardas 1996). Goldschmid *et al.* (1980) reported that amphipods, polychaets and algae dominated in the stomach contents, and Jardas (1996) generally noted benthic invertebrate communities,

(1) Faculty of Natural Science and Mathematics, University of Split, Teslina 12, 21000 Split, CROATIA. [msantic@pmfst.hr]
(2) Institute of Oceanography and Fisheries, Šet. I. Meštrovića 63, 21000 Split, CROATIA. [pallaoro@izor.hr] [jardas@izor.hr]

Cybium 2007, 31(1) : 51-57.

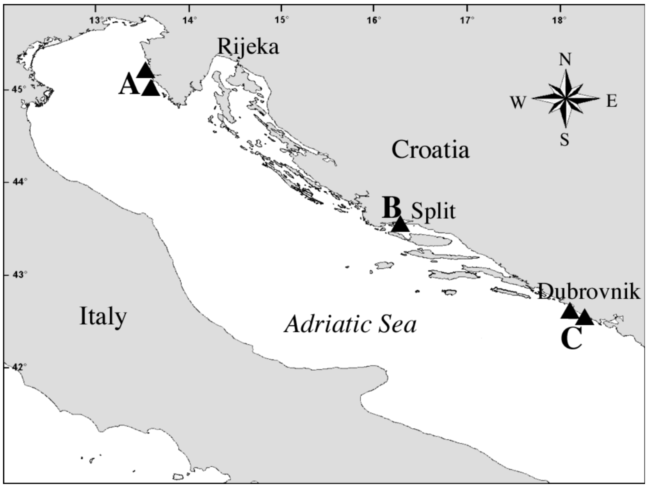

Figure 1. - Study area and sampling localities of *Salaria pavo* in the Adriatic Sea. **A**: Coasts of Rovinj; **B**: Kaštela Bay; **C**: Coasts of Cavtat. *[Zone d'étude et localités de captures de* Salaria pavo *en mer Adriatique.]*

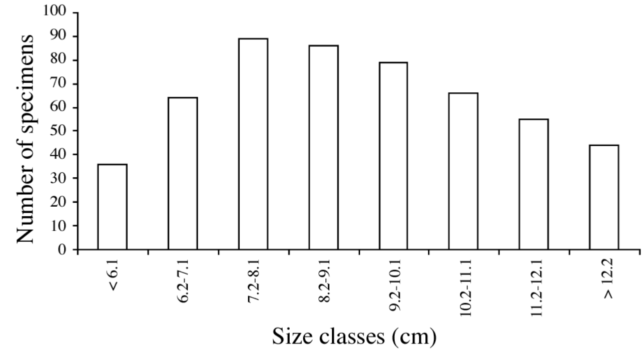

Figure 2. - Length frequency distribution of 518 individuals of *Salaria pavo* caught in the Adriatic Sea. *[Distribution des fréquences de taille des 518 spécimens de* Salaria pavo *capturés en mer Adriatique.]*

algae and detritus in the diet. The literature referring to other regions is also not very extensive. The diet peacock blenny in the Mediterranean Sea is mainly based on benthic crustaceans, molluscs, polychaets, fish eggs and algae (Fishelson, 1963b; Gibson 1968; Zander, 1986). Svetovidov (1964) revealed that in the Black Sea algae and crustaceans formed the dominant prey of *S. pavo*.

The purpose of the present study was to examine the diet of *S. pavo* in the Adriatic Sea. The effects of fish size and diurnal cycle on stomach contents were included to provide a more comprehensive examination of the trophic ecology of this species.

MATERIAL AND METHODS

Samples of *Salaria pavo* were taken at 3 localities in the eastern Adriatic Sea in mesolittoral and shallow infralittoral zone (Fig. 1). Fish samples were collected by a small beach seine. Net depth at beginning of wing was 30 cm and 250 cm at central part together with the sac. Outer wings were of 8 mm mesh size and central sac of 4 mm. The net was always hauled from the entrance to the cove to its inner end. A total of 518 specimens were collected between April and October 2002 and 2003. Samples were taken in three times per day; the first was from 05:00 to 08:00 hours (N = 182), the second from 13:00 to 16:00 hours (N = 160), and the third from 18:00 to 21:00 hours (N = 176). Total length (TL) of fish was measured to the nearest 0.1 cm and weighted to the nearest 0.1 g. Immediately after capture, fish were dissected and the gut were removed and preserved in a 4% formalin solution. Evidence of regurgitation was never observed in any fish. In the laboratory, prey identification was carried out to the low-

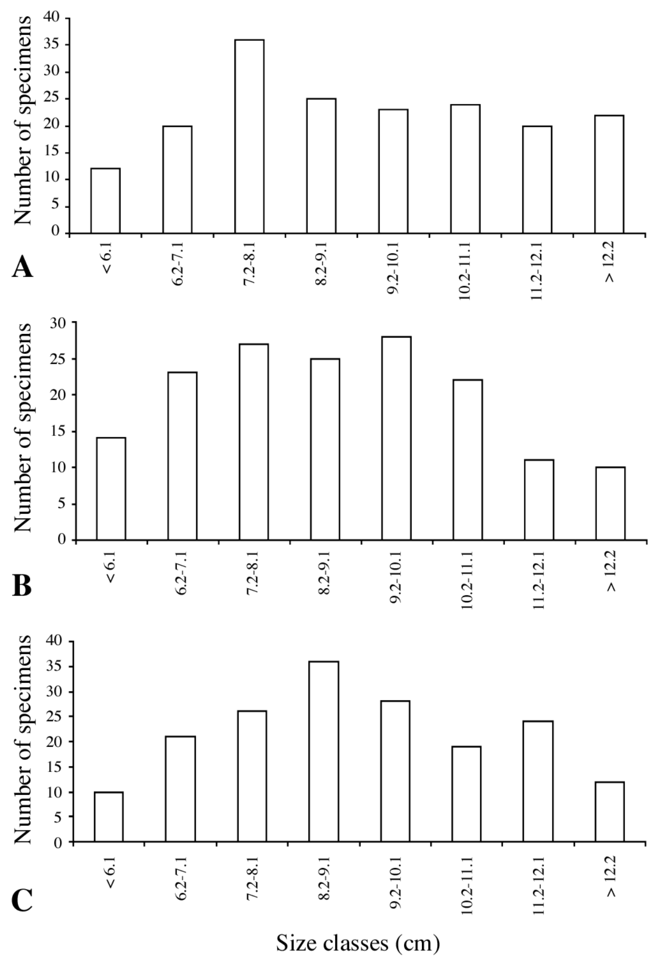

Figure 3. - Length frequency distribution of *Salaria pavo* in early morning (**A**) daily (**B**) and evening (**C**) samples. *[Distribution des fréquences de taille de* Salaria pavo *(**A**) tôt le matin, (**B**) en journée, et (**C**) en soirée.]*

Food items	(%F)	(%Cn)	(%Cw)	IRI	% IRI
Algal remains	7.05	3.51	4.48	56.3	1.8
Spongia					
Unidentified Spongia	2.91	1.44	2.66	11.9	0.4
Mollusca					
Gastropoda					
Monodonta turbinata	9.00	4.55	11.34	143.0	4.6
Gibbula sp.	3.16	2.06	2.94	15.8	0.5
Cerithium sp.	2.67	1.44	1.96	9.0	0.3
Rissoa sp.	2.18	1.03	2.80	8.3	0.2
Unidentified Gastropoda	6.81	4.13	2.66	46.2	1.5
Total Gastropoda	15.81	13.21	21.70	551.9	17.8
Bivalvia					
Mytilus galloprovincialis	4.86	2.68	2.80	26.6	0.8
Brachyodontes minimus	3.40	1.86	1.68	12.0	0.4
Modiolus barbatus	1.45	0.82	0.70	2.2	-
Tapes sp.	0.48	0.41	0.56	0.4	-
Unidentified Bivalvia	1.70	1.03	1.12	3.6	0.1
Total Bivalvia	9.48	6.80	6.86	129.4	4.2
Polyplacophora					
Chiton olivaceus	1.94	1.44	1.26	5.2	0.1
Chiton coralinus	1.45	1.03	1.12	3.1	0.1
Unidentified Polyplacophora	4.13	1.13	0.98	8.7	0.3
Total Polyplacophora	3.64	3.60	3.36	25.3	0.8
Polychaeta					
Unidentified Polychaeta	3.40	2.27	2.24	15.3	0.5
Crustacea					
Amphipoda					
Talitrus saltator	10.94	17.58	10.92	311.7	10.1
Gammarus olivi	8.51	7.23	6.58	117.5	3.8
Gammarus aequicauda	4.37	5.17	5.04	44.6	1.4
Gammarus sp.	4.13	3.10	2.80	24.3	0.8
Unidentified Amphipoda	4.86	5.17	2.80	38.7	1.2
Total Amphipoda	29.19	38.25	28.14	1937.9	62.7
Decapoda					
Pachygrapsus marmoratus	2.43	1.13	3.36	10.9	0.3
Palaemon serratus	2.18	0.93	2.80	8.1	0.2
Alpheus dentipes	1.45	0.72	1.82	3.6	0.1
Palaemon elegans	0.97	0.51	1.68	2.1	-
Galathea squamifera	0.72	0.31	0.84	0.8	-
Galathea sp.	0.48	0.31	0.84	0.5	-
Porcellana platycheles	0.48	0.20	0.70	0.4	-
Unidentified Decapoda	2.67	1.13	2.38	9.3	0.3
Total Decapoda	7.78	5.24	14.42	152.9	4.9
Isopoda					
Idotea baltica	4.13	2.48	3.64	25.2	0.8
Sphaeroma seratum	3.89	2.27	2.66	19.1	0.6
Unidentified Isopoda	2.91	1.65	2.52	12.1	0.4
Total Isopoda	7.29	6.40	8.82	110.9	3.6
Unidentified Copepoda	3.64	5.68	1.96	27.8	0.9
Unidentified Cirripedia	4.13	4.13	1.40	22.8	0.7
Echinodermata					
Unidentified Ophiuroidea	1.94	1.24	2.52	7.3	0.2
Fish eggs					
Unidentified eggs	3.64	9.20	1.54	39.0	1.2
Insecta					
Unidentified Hymenoptera	0.48	0.20	0.56	0.3	-
Unidentified Coleoptera	0.72	0.31	0.84	0.8	-
Total Insecta	1.21	0.51	1.40	2.3	-

Table I. - Diet composition of 430 *Salaria pavo* (%F = percentage frequency of occurrence; %Cn = percentage numerical composition; %Cw = percentage gravimetric composition; IRI = index of relative importance). Only prey species with a contribution to the %IRI of more than 0.1 are listed (- indicates less than 0.1%). *[Composition de l'alimentation de 430* Salaria pavo *(%F = pourcentage d'occurence; %Cn = pourcentage numérique; %Cw = pourcentage pondéral; IRI = index d'importance relative).]*

est possible taxonomic level. Species abundance and wet weight to the nearest 0.001 g after removal of surface water by blotting on blotting paper were recorded. Total length of the fish examined ranged from 4.9 to 14.4 cm ($\bar{x}$ = 8.41 cm). In order to evaluate variation in food habits as a function of size, specimens from 6.2 to 12.1 cm were separated in 1 cm length classes. Because of small sample sizes at other fish lengths, the remaining fish were separated into two classes: < 6.1 (N = 36) and > 12.2 (N = 44). The number of specimens analyzed per size class ranged from 36 to 89 (Fig. 2). Length frequency distribution in early morning, daily and evening samples are shown in figure 3.

Numerous indices have been described for quantitatively expressing the importance of different prey in the diets of fish (Berg, 1979; Hyslop, 1980; Tirasin and Jørgensen, 1999). Those used in the present study were:

Vacuity index (VI) = number of empty stomachs divided by total number of stomachs multiplied by 100. Percentage frequency of occurrence (%F) is the frequency of occurrence of a prey item in the total number of non-empty stomachs. %F = (number of stomachs including a prey item / number of non-empty stomachs) x 100. Percentage numerical abundance (%Cn) is the abundance of prey item in the total number of prey items identified in the total number of non-empty stomachs. %Cn = (number of prey items / total number of prey items) x 100. Percentage gravimetric composition (%Cw) is the wet weight of prey items in the total wet weight of non-empty stomachs. %Cw = (weight of prey items / total weight of prey items) x 100.

The main food items were identified using the index of relative importance (IRI) of Pinkas *et al*. (1971), as modified by Hacunda (1981): IRI = %F x (%Cn + %Cw)

This index has been expressed as: %IRI = (IRI/ ∑ IRI) x 100

Prey were sorted in decreasing order according to IRI and then cumulative %IRI was calculated. Statistical differences ($p < 0.05$) in diet composition with respect to length class and diurnal cycle were assessed by a chi-square test (Sokal and Rohlf, 1981) of the frequencies of a given prey. The variation in vacuity index was also tested by a chi-square test over a contingency table of number of empty stomachs.

Effects of length class and diurnal cycle on the mean number (Nm/ST) of prey items and mean weight per stomach (Wm/ST) were tested by analysis of variance (ANOVA), after checking the normality of each variable and the homogeneity of variances (Sokal and Rohlf, 1981). Tukey's test was employed to locate the source of significant differences.

Proportional food overlap between size classes and diurnal cycle was calculated using Schoener's (1970) dietary overlap index: $C_{xy} = 1 - 0.5 \sum |P_{xi} - P_{yi}|$, where P_{xi} and P_{yi} are the proportion of prey *i* (based on %IRI) found in the diet of groups *x* and *y*. This index ranges from 0 (no prey overlap) to 1 (all food items in equal proportions). Schoener's index values above 0.6 are usually considered to indicate significant overlap (Wallace, 1981).

RESULTS

Feeding intensity

Of the 518 stomachs of peacock blenny examined, 88 were empty (16.9%). Vacuity index (29.3% in daytime, 10.2% in the evening and 12.6% in the morning hours) varied significantly over the diurnal cycle ($\chi^2 = 17.8$, df = 2, $p < 0.05$). The proportion of empty stomachs among size classes, ranged from 14.4% (size class < 6.1 cm) to 20.3% (size class 6.2-7.1 cm), did not differ significantly ($\chi^2 = 1.7$, df = 7, $p > 0.05$).

Diet composition

The stomach content of peacock blenny consisted of eight major groups: Amphipoda, Gastropoda, Decapoda, Bivalvia, Isopoda, fish eggs, Algae and "others" was identified from stomach contents. Group "others" including prey with contribution in total IRI less than 0.1% (Cirripedia, Polychaeta, Spongia, Copepoda, Polyplacophora, Ophiuroidea and Insecta). Amphipods were the most frequently observed prey, constituting 62.7% of the total IRI, followed by gastropods (%IRI = 17.8). Other prey groups found in the stomach contents were comparatively lower and of less importance. At the species level, amphipods *Talitrus saltator* (%IRI = 10.1) followed by gastropods *Monodonta turbinata* (%IRI = 4.6) and amphipods *Gammarus olivi* (%IRI = 3.8) were the most frequent prey (Tab. I).

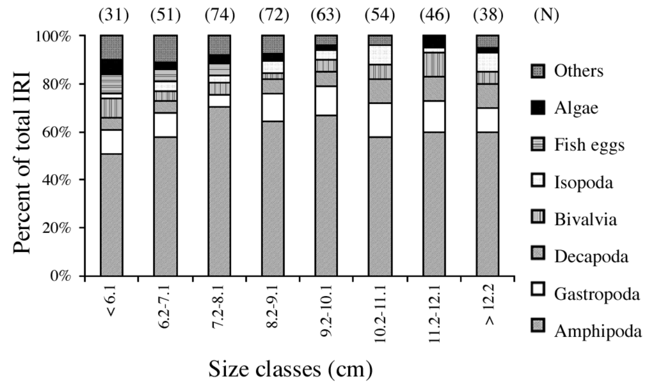

Figure 4. - Composition of *Salaria pavo* diet among size classes based on the % IRI values of the major prey groups; N = number of non-empty stomachs analyzed in each size classes. *[Alimentation de* Salaria pavo *en fonction de la taille, basée sur les % de valeurs d'IRI des groupes principaux de proies; N = nombre d'estomacs non vides analysés dans chaque classe de taille.]*

Food in relation to fish size

Diet composition with regard to cumulative percentage IRI of the eight main prey groups is shown in figure 4. There was little variation in food habits in relation of peacock blenny size. The values of Schoener's index indicate significant dietary overlap between size classes (Tab. II). Amphipods were the most important prey and represent more than 50% of total IRI in all size classes. The proportion of other prey groups was comparatively low. Gastropods and decapods showed tendency to increase with peacock blenny size, while fish eggs occurred only in stomach contents of small specimens. Although contribution of those prey groups varied with peacock blenny size, chi-square test revealed significant difference only for fish eggs ($\chi^2 = 13.7$, df = 7, $p < 0.05$). The mean weight of prey items (Wm/ST) increased with increasing size up to 8.2-10.1 cm size class and then declined. However, those changes were not signifi-

Table II. - Food overlap coefficients (Schoener's index) of the diet between size classes of *Salaria pavo*. *[Coefficients de recouvrement alimentaire (index de Schoener) entre les classes de taille de* Salaria pavo.*]*

Size class (cm)	< 6.1	6.2-7.1	7.2 - 8.1	8.2-9.1	9.2-10.1	10.2-11.1	11.2-12.1
6.2-7.1	0.90						
7.2-8.1	0.75	0.88					
8.2-9.1	0.80	0.84	0.87				
9.2-10.1	0.79	0.87	0.85	0.92			
10.2-11.1	0.78	0.85	0.76	0.87	0.85		
11.2-12.1	0.80	0.79	0.75	0.80	0.84	0.86	
> 12.1	0.79	0.80	0.80	0.84	0.88	0.89	0.88

cant ($F = 2.23$, $p > 0.05$). Also, mean number of prey items (Nm/ST) did not significantly varied among size classes ($F = 3.10$, $p > 0.05$) (Fig. 5).

Diurnal variation in the diet

Early morning diets were measured 05-08, daily 13-16 and evening, between 18-21 hours. The feeding habits of peacock blenny varied over the diurnal cycle (Fig. 6). Amphipods were the most important prey in morning (%IRI = 74.0) and evening (%IRI = 71.0), while gastropods (%IRI = 36.8) and bivalves (%IRI = 25.5) predominated during daily hours. Decapods and isopods occurred most frequently in the stomach contents during the evening and early morning. Also, Schoener's dietary overlap index reveals a significant difference between daily and evening-morning diet (Tab. III). A chi-square test revealed non-significant differences only for fish eggs ($\chi^2 = 1.9$, df = 2, $p > 0.05$) and "others" group ($\chi^2 = 1.3$, df = 2, $p > 0.05$). The mean weight (Wm/ST) and the mean number of prey items (Nm/ST) varied significantly along the day (ANOVA, $F = 15.2$, $p < 0.05$; $F = 18.7$, $p < 0.05$) (Fig. 7). In both cases, Tukey's test revealed that values of Wm/ST and Nm/ST in the early morning and evening significantly differ than the daily hours.

DISCUSSION

Our study indicates that peacock blenny living in the eastern Adriatic Sea mostly feeds on animal food with lower contribution of algae in the diet. This finding agrees with those of Gibson (1968) and Goldschmid *et al.* (1980). In the Adriatic Sea, Goldschmid *et al.* (1980) listed this species in a group between omnivores grazers and carnivores, together with *Lipophrys adriaticus* and *L. nigriceps*, in which animal component dominated in the diet. Morphological adaptations of the teeth correlated with the feeding habits of this species (Goldschmid *et al.*, 1980). In the western Mediterranean, *S. pavo* take animal food with appreciable quantities of plant matter, usually fragments of *Posidonia* leaves and algae (Gibson, 1968). On the other hand, Fishelson (1963b) reported only animal food (polychaets, crustaceans and fish eggs) in the stomach of peacock blenny from the Israel waters.

In our study, various prey groups and species found in the stomach implies that peacock blenny is a generalistic fish. The data of Gibson (1968), about the food composition of this species (range 3.2-11.8 cm) collected in the Banyuls region confirm presumption of its generalistic behavior. Namely, in 48 specimens the stomachs constained 14 different zoobenthic groups, algae and insects. The inclusion of insects in the diet may be due to the fact that peacock blennies were frequently in large shallow pools where they would collect insects from the air (Gibson, 1968).

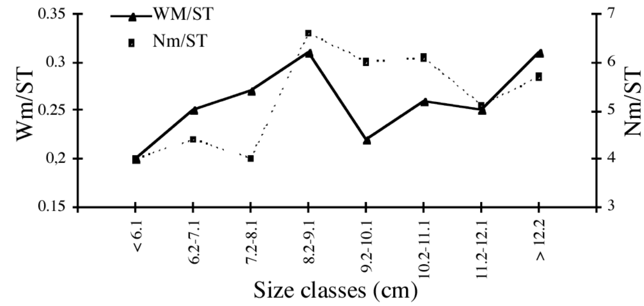

Figure 5. - Variation of the mean weight of prey per stomach (Wm/ST) and mean number of prey items per stomach (Nm/ST) of *Salaria pavo* among size classes. *[Variation du poids moyen des proies par estomac (Wm/ST) et du nombre moyen de proies par estomac (Nm/ST) de* Salaria pavo *en fonction de la taille.]*

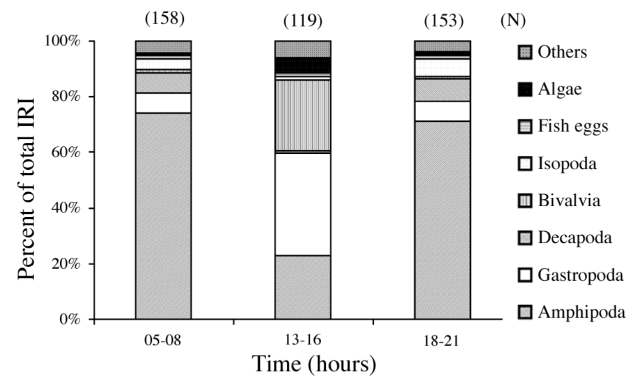

Figure 6. - Diet composition of *Salaria pavo* during the diurnal cycle, based on the %IRI values of the major prey groups; N = number of non-empty stomachs analyzed in each time. *[Alimentation de* Salaria pavo *pendant le cycle journalier, fondée sur les valeurs de %IRI des proies principales ; N = nombre d'estomacs non vides analysés à chaque période.]*

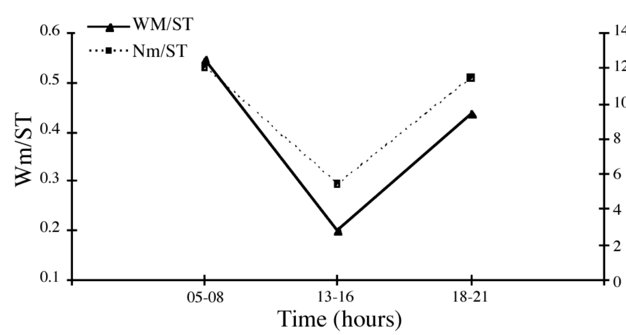

Figure 7. - Variation of the mean weight of prey per stomach (Wm/ST) and mean number of prey items per stomach (Nm/ST) of *Salaria pavo* during the diurnal cycle. *[Variation du poids moyen des proies par estomac (Wm/ST) et du nombre moyen de proies par estomac (Nm/ST) de* Salaria pavo *pendant le cycle journalier.]*

Table III. - Food overlap coefficients (Schoener's index) of the diet of *Salaria pavo* during the diurnal cycle. *[Coefficients de recouvrement alimentaire (index de Schoener) de* Salaria pavo *pendant le cycle*

Time (hours)	05-08	13-16
13-16	0.40	-
18-21	0.91	0.38

According to our data, amphipods were the most common prey, such as *Talitrus saltator* and less commonly *Gammarus olivi*. These prey group, which represents more than 50% of total IRI, can be classified as main food (Rosecchi and Nouaze, 1987) in the Adriatic waters. Gastropods, such as *Monodonta turbinata*, were secondary prey while other prey groups were of minor importance and probably represent occasional food. The pattern of stomach contents of peacock blenny in the present study agrees well with field distribution patterns of several amphipods species. For example, *T. saltator* and *G. olivi* commonly present in shallow waters in the Adriatic and Mediterranean Sea (Pérès and Gamulin-Brida, 1973; Budd, 2002). Similar to the result of the present study, Gibson (1968) reported that amphipods (%F = 46%) dominated in the stomach contents of peacock blenny followed by gastropods (%F = 35%) and polychaets (%F = 35%). A study of Fishelson (1963b) and Goldschmid *et al.* (1980) also recognized amphipods as the most important prey items of *S. pavo*. In the Black Sea, amphipods (family Gammaridae) and isopods together with algae constituted main prey of this species (Svetovidov, 1964). Taken together, the results of these studies confirms the importance of amphipods in the diet of peacock blenny.

The ontogenetic switch in feeding habits is a general phenomenon among fish as a result of increasing body size. However, in our study the stomach content analysis did not indicate a clear trend in prey selection with fish size, since all size classes of *S. pavo* fed on relatively similar prey types (i.e., mainly amphipods and less gastropods, bivalves and decapods), with exception of fish eggs that were consumed only by the smaller specimens (up to 8.1 cm). This assumption may be confirmed high values of Schoener's index comparing size classes. Probably, the morphological constraints such as toothless upper jaw, the small mouth size and gape and foraging behavior impose certain limitations on the diet peacock blenny and restrict their food to small benthic animals.

A higher percentage of non-empty stomachs (83.1%) were found in the collected samples during the study period (April-October). This can be explained by availability of the prey or the temperature-dependent physiologic process. In the Adriatic Sea, water temperatures reach a maximum at the end of spring and during the summer (Zore-Armanda *et al.*, 1991). Increased metabolism of the fish probably stimulated predation during the study period. However, in the Adriatic waters many groups of benthic organisms are present in higher abundance and density during warmer part of the year (Baranović *et al.*, 1992). Similar to our result, high degrees of stomach fullness (study period April-May) were reported for this species in the western Mediterranean (Gibson, 1968).

The food composition and dietary overlap reveal significantly changed over the diurnal cycle. Amphipods dominated during the evening and early morning, while gastropods, and bivalves were most frequent in daily feeding. Also, stomach contents of peacock blenny indicate a distinct 24-h rhythm of feeding. It feeds chiefly at evening and early morning at time of lower light intensity. This presumption confirmed the lowest empty stomachs and highest values of mean weight (Wm/ST) and mean number (Nm/ST) during the evening and early morning. Feeding intensity is negatively related to the percentage of empty stomachs and positively related to the degree of fullness index (Bowman and Bowman, 1980). Increased feeding of peacock blenny during lower light intensity may be related to the higher occurrence of amphipods at same time. However, this assumption probably supported swimming activity of peacock blenny, which was highest from evening to early morning (Pallaoro, 1988). Fishelson (1963b) and Jardas (1996) also reported nocturnal feeding activity of this species in the eastern Mediterranean and Adriatic Sea. Pallaoro (1988) noted increased activity of this species during the daytime only on shaded place.

In summary, *S. pavo* is a generalistic fish, whose diet in the eastern Adriatic Sea as well as in French and Israel waters, consists in various benthic invertebrates groups with lower contribution of algae. This species feeds chiefly at evening and early morning, during the lower light intensity. Probably, feeding intensity along the diurnal cycle corresponded with activity of main prey items.

REFERENCES

ALMADA V.C., GONÇALVES E.J., SANTOS A.J. & C. BAPTISTA, 1994. - Breeding ecology and nest aggregations in a population of *Salaria pavo* (Pisces: Blenniidae) in an area where nest sites are very scarce. *J. Fish Biol.*, 45: 819-830.

BUDD G.C., 2002. - *Talitrus saltator*, a Sand Hopper. Marine Life Information Network: Biology and Sensitivity Key information Sub-programme. Plymouth: Marine Biological Association of the UK.

BARANOVIĆ A., VUČETIĆ T. & T. PUCHER-PETKOVIĆ, 1992. - Long-term fluctuations of zooplankton in the middle Adriatic Sea (1960-1982). *Acta Adriat.*, 33: 85-120.

BERG J., 1979. - Discussion of methods of investigating the food of fishes with reference to a preliminary study of the prey of *Gobiusculus flavescens* (Gobiidae). *Mar. Biol.*, 50: 263-273.

BOWMAN R.E. & E.W. BOWMAN, 1980. - Diurnal variation in the feeding intensity and catchability of silver hake (*Merluccius bilinearis*). *Can. J. Fish. Aquat. Sci.*, 37: 1565-1572.

FISHELSON L., 1963a. - Larval development and metamorphosis of *Blennius pavo* Risso (Teleostei, Blenniidae). *Isr. J. Zool.*, 12: 81-91.

FISHELSON L., 1963b. - Observation on littoral fishes of Israel. I. Behaviour of *Blennius pavo* Risso (Teleostei, Blenniidae). *Isr. J. Zool.*, 12: 67-80.

GIBSON R.N., 1968. - The food and feeding ralationships of littoral fish in the Banyuls region. *Vie Milieu*, 19: 447-456.

GOLDSCHMID A., KOTRSCHAL K., KRAUTGARTNER W.D. & H. ADAM, 1980. - Morphologie des Gebisses und Nahrungspräferenzen von dreizehn adriatischen Blenniiden (Teleostei, Perciformes). *Zool. Scripta*, 9: 67-78.

GONÇALVES D.M., SIMÕES A., CHUMBINHO A.C., CORREIA M.J., FAGUNDES T. & R.F. OLIVEIRA, 2002. - Fluctuating asymmetries and reproductive success in the paecock blenny. *J. Fish Biol*., 60: 810-820.

HACUNDA J.S., 1981. - Trophic relationships among demersal fishes in coastal area of the Gulf of Maine. *Fish. Bull*., 79: 775-788.

HYSLOP E.J., 1980. - Stomach contents analysis: a review of methods and their application. *J. Fish Biol*., 17: 411-429.

JARDAS I., 1996. - Adriatic ichthyofauna. Školska knjiga d.d., Zagreb. [in Croatian]

KOTRSCHAL K., 1988. - Blennies and endolithic bivalves: Differential utilization of shelterin Adriatic Blenniidae (Pisces: Teleostei). *Mar. Ecol*., 9: 253-269.

MOOSLEITNER H., 1980. - Zentrale Laichstelle ermöglicht *Blennius pavo*, Risso 1810 (Blenniidae, Perciformes, Teleostei) die Beisedlung von Sandgrund. *Zool Anzig*., 204: 82-88.

MOOSLEITNER H., 1988. - The blennies of the peninsula Chalkidiki (GR) and their distribution in the eastern mediterranean (Pisces: Teleostei: Blennioidea). *Thalassographica*, 11: 27-51.

PALLAORO A., 1988. - Biometric, biological and ecological characteristics population of *Lypophrys pavo* (Risso, 1810) (Pisces, Perciformes, Blenniidae) in the Adriatic Sea. PhD Thesis, 82 p. Univ. Zagreb.

PAPACONSTANTINOU C.A., 1977. - The dentition of some Mediterranean blennies (Pisces, Blenniidae). *Mem. Biol. Mar. Ocean*., 7: 11-19.

PAPACONSTANTINOU C.A., 1979. - The secondary sex characteristics of blennoid fishes (Pisces, Blenniidae). *Thalassographica*, 3: 57-75.

PATZNER R.A., 1985. - The reproduction of *Blennius pavo* (Teleostei, Blenniidae). III. Fecundity. *Zool Anzig*., 214: 1-6.

PÉRÈS J.-M. & H. GAMULIN-BRIDA, 1973. - Biological Oceanography - Benthos Bionomy of Adriatic Sea. Školska knjiga d.d., Zagreb. [in Croatian]

PINKAS L., OLIPHANT M.S. & I.L.K. IVERSON, 1971. - Food habits of albacore, bluefin tuna and bonito in California waters. *Fish Bull*., 152: 1-105.

ROSECCHI E. & Y. NOUAZE, 1987. - Comparaison de cinq indices alimentaires utilisés dans l'analyse des contenus stomacaux. *Rev. Trav. Inst. Pêch. Marit*., 49: 111-123.

RUCHON F., LAUGIER T. & J.-P. QUIGNARD, 1998. - Recruitment and demographic variability in a lagoonal population of the Blenniid fish *Lypophrys pavo*. *J. Mar. Biol. Ass. U.K*., 78: 609-621.

SCHOENER T.W., 1970. - Non-synchronous spatial overlap of lizards in patchy habitats. *Ecology*, 51: 408-418.

SOKAL R.R. & F.J. ROHLF, 1981. - Biometry. The Principals and Practices of Statistics in biological Research. (2nd edit.). 859 p. New York: W.H. Freemen & Company.

SVETOVIDOV A.N., 1964. - Blenniidae. *In*: Fishes of the Black Sea, pp. 345-367. Moscow-Leningrad: Nauka. [in Russian]

TIRASIN M.E. & T. JØRGENSEN, 1999. - An evaluation of the precision of diet description. *Mar. Ecol. Prog. Ser*., 182: 243-252.

WALLACE R.K., 1981. - An assessment of diet-overlap indexes. *Trans. Am. Fish. Soc*., 110: 72-76.

ZANDER C.D., 1986. - Blenniidae. *In*: Fishes of the North-eastern Atlantic and the Mediterranean, Vol. III: (Whitehead P.J.P., Bauchot M.-L., Hureau J.-C., Nilsen J. & E. Tortonese, eds), pp. 1096-1112. Paris: Unesco.

ZORE-ARMANDA M., BONE M., DADIĆ V., MOROVIĆ M., RATKOVIĆ D., STOJANOSKI L. & I. VUKADIN, 1991. - Hydrography properties of the Adriatic Sea in the period from 1971 through 1983. *Acta Adriat*., 32: 6-554.

Reçu le 8 décembre 2005.
Accepté pour publication le 17 octobre 2006.